

4 -Experimental model of capsular contracture in silicone implants¹

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ABSTRACT - The breast implant procedure is one of the most performed into Plastic Surgery and the contracture that occurs the capsule formed around the breast implants one of most frequent complication. We describe here one experimental model of capsule contracture in rats.

KEY WORDS: Capsule. Contracture. Silicone. Rats. Model.

Introduction

Recently, silicone breast implant surgery has become one of the most searched surgical procedures.

Despite the technological progress in the confection of these prostheses, the surgical procedure may lead to complications, such as seroma, hematoma, rupture, leakage or capsular contracture, being the latter one the most common, requiring a new surgical procedure.

In order to study the pathophysiology and possible treatment for capsule contracture, many animal models have been developed. The most reproducible and with the shortest time needed to contracture up growth were those using rats.^{1, 2, 3, 4, 5, 6, 7, 8, 9}

Many authors have not been able to find histological differences in capsules with and without contracture^{1, 9}, therefore have tried to evaluate the contracture by its reflection on the implanted miniprotheses internal pressure measure.^{4, 9}

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Proposition

The object of this study is to present an easy, reproducible and low cost model that objectively reflects the appearance or not of capsular contracture around silicone implants (filled with silicone gel, a commonly used material in augmentation mastoplasties and mammary reconstructions), by measuring the implant internal pressure, and correlating it with hystological findings.

Method description

Adult female rats, Wistar type, weighting from 200 to 250g, kept in light-dark cycle (12/12h), with food and water ad libitum are used.

Two cm (diameter), two ml (volume) silicone gel implants, smooth and textured surface, sterile, were used. (Figures 1 and 2)

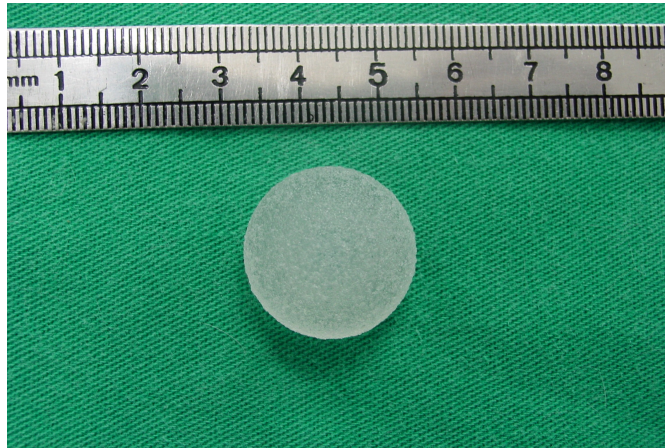


FIGURE 1 2 cc/2 cm of diameter textured silicone miniimplants.

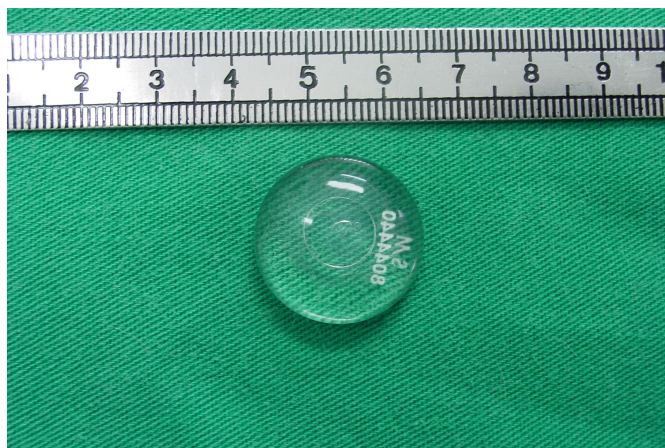


FIGURE 2 - 2 cc/2 cm of diameter smooth silicone miniimplants

The implant procedure is made under general anesthesia, using Zolazepam hydrochloride/ Tiletamine hydrochloride, 25 mg/kg (Zoletil TM50, veterinary use) and non-sterile conditions. Being the rat under anesthesia, the fur is cleared from the incision site by apprehension and removal. (Figure 3)

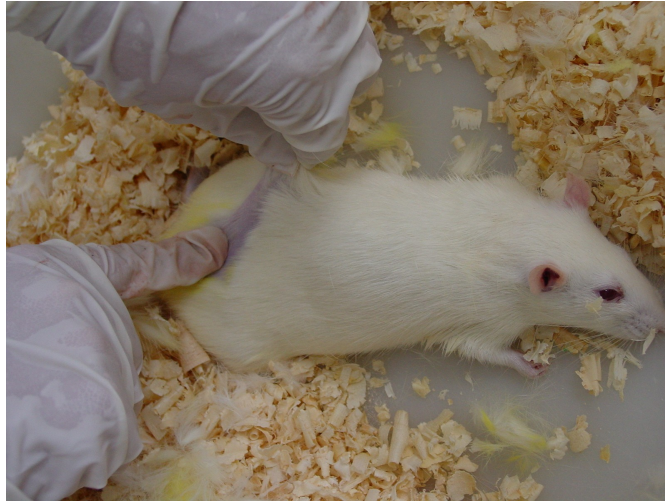


FIGURE 3 - The fur is cleared from the incision area.

A 2 cm transversal incision is done in the lumbar-sacral region.



FIGURE 4 Marked incision area.

Then, by dissection, a blind tunnel is made underneath the panniculus carnosum onto the shoulder blades, at both sides, so that the tunnels do not communicate. (Figures 5 and 6)



FIGURE 5 Blunt dissection onto the shoulder blades.

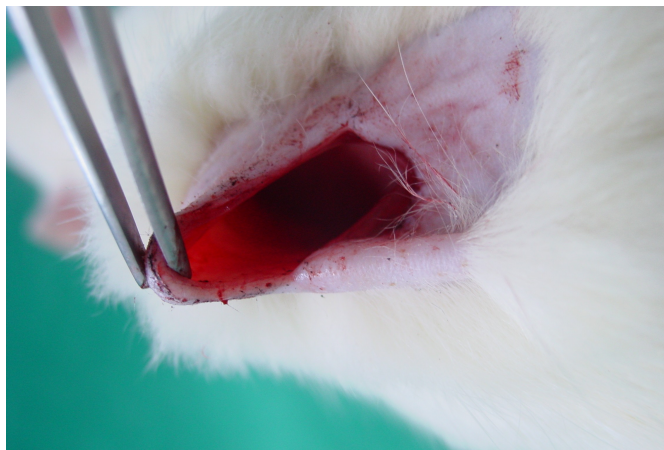


FIGURE 6 -Dissected tunnel.

Finally, the implants are introduced: the smooth surfaced at the right tunnel, the textured at the left.
(Figures 7 and 8)



FIGURE 7 Smooth miniimplants being introduced.

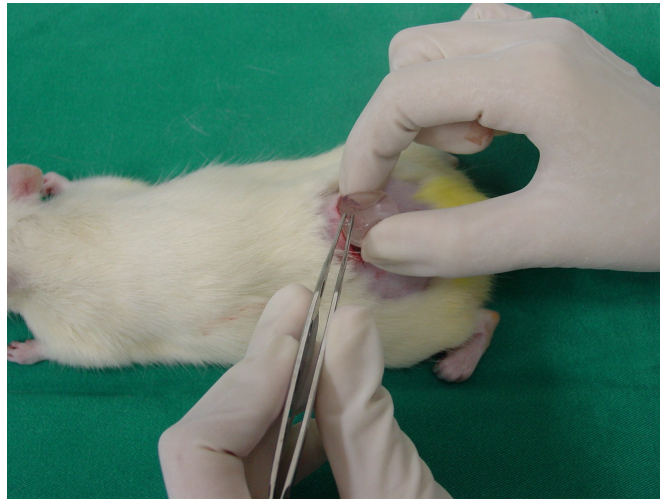


FIGURE 8 - Textured implant being introduced.



FIGURE 9 Arrows pointing to the inserted implants.

The suture is done using inverted subdermic stitches or simple stitches, with incolor 4.0 mononylon, so that traumas from other animals are avoided. This way, up to 5 animals can be kept in the same cage.

The animals are kept for 90 days and then sacrificed (time required for greatest capsular contracture incidence 4, 9).

After sacrificing the animals with overdose of anesthesia (inhalation of ether), the implant internal pressure secondary to capsular contracture, is measured using a strain gauge transducer, compatible with liquids, with normal range values varying from 0 to 10 mmHg.

A number 19 scalp is filled with water, connected to the device and inserted into the prostheses inside the animal. Due to the silicone gel viscosity, injection of 0.2 ml of distillate water may be necessary. The internal pressure is then measured.

The capsules are dissected with the surrounding tissue

The specimens are fixed using 10% buffered formalin solution and processed to hystological cuts. The tissues are embedded in paraffin and slices of 4 μm are stained with hematoxilin-eosion and to visualization of reticulin fibers. Furthermore, 4 μm thick cuts are prepared for imunohistochemic study to macrophage through

CD 68 antigen, and blood vessels and myofibroblasts through CD34 antigen. The thickness of the capsule is also measured.

Perspectives

The present simple and reproducible experimental model may lead to a better further pathophysiologic understanding and consequent new research in the treatment of capsular contracture: a difficult to understand and difficult to solve complication in silicon breast implant surgery.

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RESUMO -O procedimento cirúrgico implante de silicone mamário é um dos mais realizados dentro da Cirurgia Plástica e a contratura que ocorre na cápsula formada ao redor do implante é uma de suas maiores complicações. Descrevemos aqui um modelo experimental de contratura capsular em ratos.

DESCRITORES Cápsula. Contratura. Silicone. Ratos. Modelo.

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